Examination of *Phy 304*

Atomic Physics & Molecular Spectroscopy

Examiner: Dr. Abdel Hamid sakr

Date : 28 /5/2016, Time Allowed : 2h

Answer the following questions:

Give brief account on

- Normal Zeeman effect
- Anomalous Zeeman effect
- Stern-Gerlach Experiment
- Reduce mass and motion of the hydrogen nucleus

1. Show that the spontaneous emission increase rapidly relative to induced emission as wave number increase

2. Compare between prisms and diffraction gratings as dispersing element

3. Give brief account on the factors that may contribute to the line width and shape

Department: Physics

Course Code: Phy 411

FINAL Exam 2015/2016
Date: 28/5/2016
Time Allowed: 2 hours

Course Title: Applied electronics
Dr. : Hassan Tourk

Answer the following questions:

1- Put a true sign (√) in front of correct sentences and a false sign (×) in front of wrong sentences:

a- The value of the resistance = 260 ± 26 kΩ

( )

b- The function of the buffer is making an image of a weak input signal but with high output power. ( )

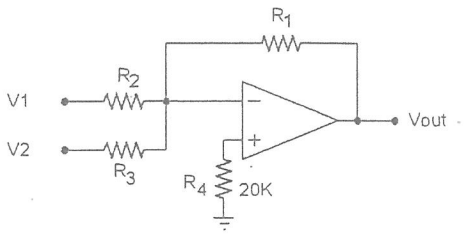
c- The offset voltage is an internal voltage is added to the output without magnification. ( )

d- A voltage source is maintain the current to be constant even the load resistance is changed. ( )

e- In the Op-Amp, the output signal is measured between the output and negative supply terminals. ( )

2- Calculate the output signal (V_{out})

$V_{1(volt)}$	$V_{2(volt)}$	R_1 (kΩ)	R_2(kΩ)	R_3(kΩ)	V_{out}(volt)
2	2	2	2	2	?
3	-1	6	1	0.5	?
-4	3	10	2	2	?
-10	-3	1	5	5	?



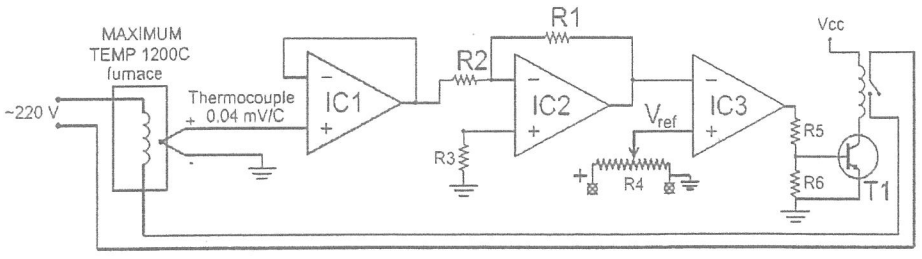
3- $(95959)_{10} = (?)_2 = (?)_{16}$

4- Calculate **a-** $(324)_{10} - (1000111)_2 = (\ ?\ )_2$ **b-** $(10101010)_2 - (111000111)_2 = (?)_2$

5- Design a voltage source of ± 8Volts up to 1 Ampere.

6- The following circuit is a temperature (ON-OFF) control. Write the function of each of the following

Serial	item	function
1	IC1	?
2	IC2	?
3	IC3	?
4	R4	?
5	R5,R6	?
6	T1	?



Good Luck

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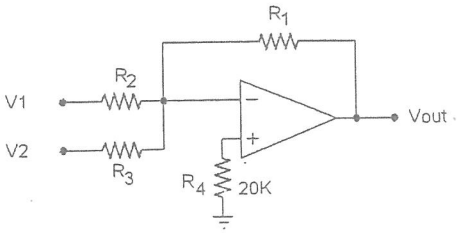

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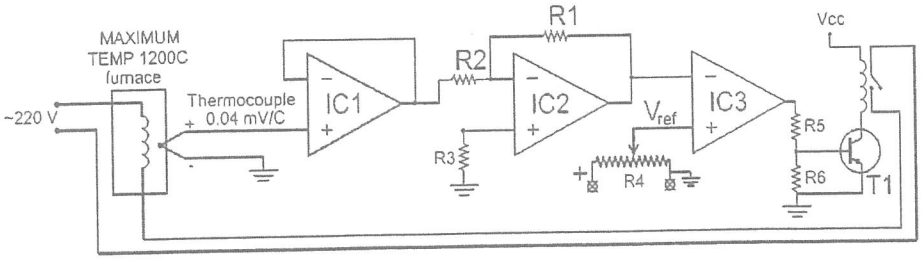

Good Luck

Department: Physics
General Physics (1)
First level

Autumn exam, 2011/2012
Date: 5 /01/2015
Time Allowed: 2 hours

Professor Dr. : Hussien Motaweh

Question no. (1) Complete the following sentences: (10 marks)

1. Quantities added to, or subtracted from, each other should all have the same .....
2. For many common materials, Poisson's ratio σ has a value between.....
3. The coefficient of viscosity depending upon the.....and .....
4. The terminal velocity, v_T, of the sphere is proportional to.....
5. Narrow pipe, low density and high viscosity help in producing ..... flow
6. Reynold's number 'k'. It is a pure number, which is independent on.....
7. Bernoulli was the first derived an equation connects the pressure to the ... and .....
8. ..... is the work which must be done to move a mass unit from one point of the gravitational field to another point
9. The ratio of latteral to longitudinal strain is called .....ratio
10. The velocity needed to escape the earth is .....

Question no. (2): (10 marks)

a) Deduce the velocity needed to escape the earth?

b) If the frequency {f} depends on each of its length {l}, the tension force {F} & the mass per unit length {μ}, deduce the equation relating together the above mentioned quantities.

Question no. (3): (10 marks)

a) Explain the device used to measure the flow speed of a gase or liquid?

b) A solid lead sphere of volume 0.5 m^3 is dropped in the ocean to a depth where the water pressure is $2x10^7$ N/m^2. Lead has a bulk modulus of $7.7x10^9$ N/m^2. **What is** the change in volume of the sphere?

Heat:

Answer the following (30 Marks):

A) Define : Heat capacity - specific heat- free convection- forced convection

B) Compare between different methods of heat transfer.

C) Deduce mathematically the expression of the coefficient of linear thermal expansion of a rod when its length changes from ℓ_1 to ℓ_2 when the temperature changes from θ_1 to θ_2.

D) Explain in details the electric thermostat.

E) How to determine the temperature of the sun.

F) Deduce an expression for the rate of heat quantity $\frac{dQ}{dt}$ for a wall of different layers.

Good Luck

Damanhur University
Faculty of Science
Department of Physics

Examination for 4th year
Nano Science And Applications
First Term : January 2015
Time Allowed: 2 hrs

❖ Answer **Only Three** of the following Questions:

1. There are two fundamental types of methods that are used in characterization of nanomaterials, imaging by microscopy and analysis by spectroscopy:
   a) What is the difference between the two types?
   b) Write down a list of the different methods in each type.
   c) Provide a short description on the scanning tunnelling microscope method.

2. Provide a short description on fabrication of nanomaterials using bottom-up methods.

3. Explain the most common physical and chemical properties that are relevant at the nanoscale.

4. **a)** Define briefly what is meant by nanoscience, nanotechnologies and nanomaterials.

   b) There are hundreds of examples of nanoscience in nature under our eyes daily; State down short discussion of some of these examples.

❖ Answer **Only Two** of the following Questions:

1. Explain the role of Nanotechnology developments in the field of data storage.

2. Show how nanotechnologies are making a great impact in the field of therapy and drug development.

3. Discuss in details how nanotechnologies can be used to solve the ordinary rechargeable batteries problems.

Good Luck & Best Wishes

Dr. El-Sayed Shalaby

Department : Physics

Course Code: *Phy. 414*

Exam : second term
Date : 2/6/2016
Time Allowed: 2 hours

Corse Title: **THIN FILMS**
Dr. : Hassan Tourk

1- Put a true sign (√) in front of correct sentences and a false sign (×) in front of wrong sentences

a- Flash evaporation is used for material evaporation gradually. ( )

b- AC Sputtering process can used for evaporate non electrical conductive material. ( )

c- An electrostatic lens used for collect the electron beam on the filament to evaporate the material. ( )

d- A thin film of a polymer can be produced using a restive heating process. ( )

e- Tungsten filament is a suitable material to evaporate all metals. ( )

2- Write short essay about:

a- Sputtering process
b- electron bombardment heating
c- RF heating
d- Resistive heating

3- A flat substrate in a vacuum chamber is located over a uniformly emitted point source, where the height is 10 cm and horizontal distance from the vertical line is 10 cm. find the deposition distribution.

4- Calculate the **rate of free evaporation** of **Ag** metal where, the vapor pressure of **Ag** is 1×10^{-5} **Torr at 800 degree centigrade** [**Ag** molecular weight = **108 gm / mole**].

5- Sketch and explain how to measure the sheet resistance of a thin film using four probe.

GOD LUCK

Department: Physics
Course Code: *Phy 410*
Semiconductor Physics and Devices

Second Term
Date: 5 / 6 / 2016
Time Allowed: 2 hours

Corse title: Semiconductor Physics And Devices
Dr: Hassan Tourk

1- Put a true sign (√) in front of correct sentences and a false sign (×) in front of wrong sentences :

a- The lattice parameters of rhombohedral structure are [$a \neq b \neq c$, $\alpha=\beta=\gamma=90°$]. ( )
b- The Brillouin zone is the same regular unit cell structure but contain one atom. ( )
c- The energy levels of the hydrogen atom are discrete due to the wave-particle duality nature of the electron. ( )
d- Tunnel effect means " the low energy particle can penetrate a high potential barrier without any reflection probability". ( )
e- We can calculate the density of allowed states from the ***k*** space. ( )

2- The Fermi level of an n-type semiconductor is 0.4 eV. Calculate the occupation probability of an energy level of 0.65 eV.

3- A particle having an energy $\mathbf{E_1}$ in a finite potential well of $\mathbf{U_0}$ and its width = **a,** State and discus all boundary conditions.

4- Calculate the density of state [$g(E)$] at $E = 0.5$ eV.

5- If you know that $N_C = 1.03\times10^{19}$, $N_V = 5.35\times10^{18}$ for **Ge** and each of E_C, E_V and E_F are equal to **0.9 eV**, **0.4 eV** and **0.2 eV** respectively. Calculate the free carrier concentration n and p.

[e = 1.6×10^{-19} C, k = 1.38×10^{-23} J/K]

GOD LUCK

Second question: complete the following statements:

1- The property of a medium necessary for propagation of mechanical waves are ……..,……..……and ……
2- Velocity of sound in vacuum is equal ……and with the rise of temperature the velocity of sound ……
3- In S.H.M the phase difference between displacement and velocity is……and between displacement and acceleration is……
4- For production beats the two waves must have the same……
5- The damping coefficient is define as ……
6- The type of oscillation in electric circuit consists of condenser, inductance and resistance is ……and its frequency is ……..
7- If the fundamental frequency in closed tube obtain at 20 Cm the second harmonic frequency will produce at……
8- The maximum velocity of particle in wave is given by ……and the maximum acceleration is given by……..
9- Lissajous figures can be obtain when two……vibrations superposed.
10- The time period of a particle in S.H.M depends on ……

Third question: Put (√) or (×) and correct the wrong

1- Longitudinal waves are also called presser waves.
2- S.H.M has variable value of total energy.
3- Doppler effect study the relation between velocity of sound and wavelength.
4- The speed of transverse wave depends on elasticity and inertia of medium.
5- In S. H.M the acceleration of the particle is constant.

Fourth question

1- A S.H.M of amplitude 5 Cm when the particle is 3 Cm from its mean position its acceleration is found to be 48 Cm/s^2 . calculate its velocity at the same instant- its time period - its maximum velocity and total energy.
2- A wave frequency 100 Hz is sent along a string towards fixed end. When the wave travels back after reflection a node is formed at a distance of 10 Cm from the fixed end of the string. Calculate the speed of wave.
3- The equation of transverse wave is given by $y = 5 \sin 2\pi(t/0.02 - x/25)$ where y in Cm and t in second. Calculate amplitude- frequency- velocity of wave – wavelength- maximum velocity and acceleration of particle-

Best wishes

Damanhur university **2nd term (2015-2016)**

Faculty of science **Subject phy. 208(vibrations and waves)**

Physics department **Time : 2 hours**

First question : choose the correct answer

1- A body executing S.H.M passes through its equilibrium position. At this instant it has
(a) Maximum kinetic energy (b) maximum potential energy
(C) minimum kinetic energy (d) maximum acceleration

2- The waves of frequency less than 20 Hz are known as (a) sonic waves
(b) infra sonic wave (C) ultrasonic waves (d) supersonic waves

3- The period of simple pendulum is double when (a) the mass of the bob is double
(b) its length increase four time (c) its length is double
(d) the mass of the bob and the length of the pendulum is double.

4- A particle is vibrating S.H.M with an amplitude of 4 Cm . The distance from equilibrium at which the potential and kinetic energy are equal is
(a) 1 Cm (b) $\sqrt{2}$ Cm (c) 4 Cm (d) $2\sqrt{2}$ Cm

5- If amplitude of two sound waves are A_1 and A_2 then on superposition, the resultant amplitude will be (a) $(A_1 + A_2)$ only (b) $(A_1 + A_2)$ only
(C) either $(A_1 + A_2)$ or $(A_1 + A_2)$ (d) $(A_1^2 + A_2^2 + 2 A_1 A_2 \cos \varphi)^{0.5}$

6- A whistle giving out 450 Hz approaches a stationary observer at a speed of 33 m/s . the frequency heard by the observer is (velocity of sound in air = 333 m/s)
(a) 409 Hz (b) 429 Hz (c) 517 Hz (d) 500 Hz

7- A string of mass 0.2 Kg/ m has length L = 0.6 m. It is fixed at both ends and stretched such that it has a tension 80 N, the string vibrates in three segments with amplitude = 0.5 Cm . then the frequency equal (a) 60 Hz (b) 100 Hz (c) 50 Hz (d) 20 Hz

8- A wave is travelling in a medium , the minimum distance between the two particles always having the same speed is (a) $\lambda/4$ (b) $\lambda/3$ (c) $\lambda/2$ (d) λ

9- The ratio of the distance between two consecutive crests and distance between two consecutive compression is
(a) equal to one (b) more than one (c) less than one (d) none of these

10- Two S.H.M are respectively represented by Y = a sin (wt- Kx) and Y= b cos(wt- Kx) the phase difference between the two waves is (a) $\pi/2$ (b) $\pi/4$ (c) zero (d) π